An Expenditure-based Approach to Poverty in the UK

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In most high-income countries, researchers have generally focused on household income when assessing households' economic well-being. A common way to measure poverty rates has been to look at the number of individuals whose household income falls below a certain threshold (e.g. Eurostat, 2017). However, for both theoretical and practical reasons, it has been argued that expenditure may be a better indicator of longer-term financial circumstances and should therefore be considered when measuring living standards (e.g. Brewer & O'Dea, 2012; Noll, 2007). Evidence is lacking on what happened to living standards in the UK on expenditure-based measures during and after the 2008 recession. This paper addresses this gap by using Living Costs and Food Survey data to provide expenditure-based poverty analysis and explain any movements in poverty rates in the UK between 2002 and 2016. We present some results suggesting that households at the very bottom of the income distribution have disproportionately high expenditure and we attempt to offer some explanation for this pattern. In addition, a demographic breakdown of expenditure poverty is provided, which helps address the important question of who is considered poor when expenditure is used to measure poverty. An extra dimension is added to the analysis by looking at the relationship between personal well-being and income and expenditure.

1. Introduction

Most research related to understanding monetary poverty and material living standards in the UK has focused on household income as a measure of monetary poverty. One of the strengths of household income as a measure is that it is a good proxy for the resources available to an individual to consume or save. Household income is also attractive as a measure as it can be directly influenced through government policy, particularly through the tax and benefits systems. Despite this, there are a number of both theoretical and pragmatic arguments for considering household spending alongside income when measuring poverty and material living standards, more generally (see e.g. Brewer & O'Dea 2017; Serafino & Tonkin, 2017; UNECE, 2017).

Conceptually, consumption expenditure is thought to be a better measure of achieved living standards as it is through the consumption of goods and services that people satisfy their needs and wants over time. Supporting this argument, researchers have found a stronger relationship between consumption and subjective well-being than between income and subjective well-being (e.g. Lewis, Snape & Tonkin, 2014; Meyer & Sullivan, 2011).

In addition, income tends to be more volatile than consumption and, as such, it may not adequately reflect an individual's well-being. For example, short-term unemployment or sickness may cause a temporarily reduction in income which will not necessarily be matched by a corresponding

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drop in consumption or well-being. Similarly, more systematic lifetime fluctuations that lead to a reduction in income may not adversely affect consumption, as people might be spending their wealth, for example. According to Friedman's "permanent income hypothesis" (Friedman, 1957), an individual's consumption at any point in time is determined not just by their current income but also by their longer-term income expectations. While the permanent income hypothesis may not hold strictly, as consumption is likely to fluctuate less than income, it might be considered a better proxy of living standards (Cutler and Katz, 2002).

Beyond these theoretical arguments, there is also the practical consideration that consumption expenditure tends to be measured more accurately than income towards the lower end of the income distribution, with evidence from both the United States and United Kingdom of under-reporting of certain forms of income, such as benefits (Brewer & O'Dea, 2017, Meyer & Sullivan, 2013). This advantage of consumption expenditure may be ascribed to the fact that survey questions about household spending are usually seen as less sensitive than questions about income (with some exceptions). Furthermore, people towards the bottom of the income distribution often have multiple income sources, which makes measurement error harder to avoid.

It is important to recognise, however, that consumption expenditure data also have their limitations. From a conceptual viewpoint, the first thing to note is that consumption expenditure, which is measurable using LCFS data, is not the same as consumption itself. Attanasio and Pistaferri (2016) summarise why the two concepts may not always coincide. The first of these is that many durable goods can provide benefits for long periods after being purchased. This consumption may not be captured under an expenditure-based measure since expenditure surveys generally only consider payments made within a defined period. This means that levels of expenditure poverty may be exaggerated for households owning valuable assets outright. Since for most households, housing stock is the most valuable asset held, this is an important motivation behind the exclusion of housing costs in expenditure-based poverty measures.

In addition to the conceptual issues discussed above, nonresponse and measurement errors may also be present. For example, certain expenditure items, such as alcohol, tobacco and gambling, tend to be under-reported in surveys, due to the stigma attached to their consumption. Other potential limitations of using consumption expenditure to study poverty include questions around individual choice (particularly when higher poverty thresholds are used), as well as practical considerations such as the cost of collecting comprehensive data

Overall, both income and consumption have their own strengths and limitations. Because of this, important insights may be obtained by considering income and consumption together when measuring poverty. This is consistent with the recommendations of the Report by the Commission on the Measurement of Economic Performance and Social Progress (Stiglitz, Sen, and Fitoussi, 2009) as well as the OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth (2013) and the UNECE Guide on Poverty Measurement (2017).

We add a further dimension to our analysis by considering the relationship between income/expenditure poverty and personal well-being. Previous analysis by Lewis, Snape & Tonkin, (2014) presents evidence of a positive correlation between household income/expenditure and life satisfaction, holding other factors fixed. They also find that household expenditure has a stronger relationship with people's life satisfaction than income does. This paper updates and builds upon that analysis, including an examination of the relationship between well-being and relative income and expenditure poverty.

2. Data sources and methodology

Throughout this analysis, the primary data source used to derive measures of both income and expenditure poverty is the Living Costs & Food Survey (LCFS). The LCFS is a cross-sectional face-to-face survey of private households, which collects detailed information on both income and spending at the household and individual level. The survey uses a two-week personal diary for individuals aged 16 and over to collect information on the purchasing of non-durable goods, including alcohol and tobacco. The LCFS is used as it is the only official data source to collect detailed data on both income and expenditure, thereby allowing analysis of the overlap between the two measures.

Income & Expenditure definitions

The expenditure measure we use includes spending on items that tend to be frequently purchased (e.g. food, drink, household consumables, petrol), as well as expenses that are incurred less frequently (e.g household furnishing and appliances, other durable goods[2]). We exclude housing costs (rent, mortgage payments, water rates, council tax, etc.)[3] putting our expenditure measure on an 'after housing costs' (AHC) basis. Certain types of households, such as those who own their home outright, have relatively low levels of expenditure compared to those who rent or own their home with a mortgage. The latter have higher housing costs but their expenditure does not adequately reflect their consumption of housing services. The use of an AHC measure of expenditure therefore avoids incorrectly identifying owner-occupiers as experiencing poverty due to their relatively low spending on housing.

Our main aim is to assess the differences between income and expenditure poverty and it is therefore important that our measures of the two are as consistent as possible. For this reason, the measure we use for income is household disposable income after housing costs (AHC). Disposable income is the amount of money that households have available for spending and saving after direct taxes (such as Income Tax, National Insurance and Council Tax) and pension contributions have been accounted for. It includes earnings from employment, private pensions and investments as well as cash benefits provided by the state.

The expenditure and income measures used in this analysis are both equivalised. Equivalisation is the process of accounting for the fact that households with many members are likely to need a higher income to achieve the same standard of living as households with fewer members. Both income and expenditure are adjusted using OECD-modified 'companion' scaled developed for AHC measures in DWP's Households Below Average Income series.[4]

Poverty definition

For the purpose of this analysis, someone is described as being in income poverty if they live in a household with an income below 60% of the national median. Similarly, someone is described as in expenditure poverty if their household has expenditure levels below 60% of median expenditure.

These are relative poverty measures that measure income or expenditure of a household compared with other households. The rationale for such an approach comes from a definition of poverty that considers individuals' capacity to participate fully in society. As such, being at risk of poverty does not necessarily imply an absolute low standard of living. These types of relative measure are consistent with those used in primary source of poverty statistics in the UK, Department for Work and Pensions' Households Below Average Income statistics (e.g. DWP, 2018). They are also the main form of measure used in most countries across the EU and OECD.

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[2] We do not impute consumption flows from ownership of durables, like housing or cars.
[3] For more details on how the AHC measures of income and expenditure are derived, please see Annex A.
[4] Information on the OECD-modified 'companion' scaled is provided in Annex B

Well-being analysis

To study the relationship between personal well-being and household income and expenditure, we use a well-being question answered in the LCFS in 2016/17, by approximately 7500 individuals – 'Overall, how satisfied are you with your life nowadays?'. Respondents answer this question on a scale of 0 to 10, where 0 is 'not at all' and 10 if 'completely'. We make use of regression analysis techniques, which allow us to see how responses to the above well-being question vary by specific characteristics and circumstances of individuals, while holding other characteristics constant. This, in turn, provides a better method of identifying which factors affect personal well-being more strongly, than simply looking at the correlation between life satisfaction scores and household income and expenditure.

Two different regression analysis techniques were used in the analysis: ordered probit and ordinary least squares (OLS). The main advantage of OLS is that the interpretation of the regression results is more simple and straightforward than in alternative methods. One potential issue with OLS is that there is an implicit assumption made that the dependant variable of interest is continuous, which is not the case with our personal well-being scores. OLS also assumes a linear relationship between the dependent and explanatory variables. In other words, there is an implicit assumption that the interval between any two values of the categorical dependent variable is of the same magnitude. This assumption, however, need not hold, especially when dealing with subjective ratings like well-being scores. For example, it could be that only small changes in people's circumstances are required to move them from a well-being score of 2 to 3, but it may take a lot more for someone to move from 6 to 7.

An alternative method is therefore use an ordered probit/logit model which is better suited to estimating the relationship between an ordinal dependant variable and a set of independent variables. In our case, ordinal data values can be ranked on a scale from 0 to 10 with each higher category representing a higher degree of personal well-being. Unlike OLS, ordered probit regression does not assume that the differences between the ordinal categories in the personal well-being rankings are equal. Instead, they capture the qualitative differences between different scores. It is important to note that ordinal probit/logit performs several probit/logistic regressions simultaneously, assuming that the models are identical for all scores. Although the latter assumption can be relaxed, interpretation of results becomes more difficult.

Existing literature suggests that OLS may still be reasonably implemented when there are more than four levels of the ordered categorical responses, particularly when there is a clear ordering of the categories as is the case for the personal well-being questions which have response scales from 0 to 10 (Larrabee, 2014). Several studies applied both methods to personal well-being data and found results were very similar between the OLS models and theoretically preferable methods, such as ordered probit. For example, see Ferrer-i-Carbonell and Fritjers (2004) for a detailed discussion of this issue.

For the sake of completeness, we estimated our models using both OLS and ordered probit regressions. Since the relative coefficient sizes and statistical significance levels produced using probit model and OLS are very similar, we only present results from the latter, as these are more straightforward to interpret. In order to isolate the relationship between income/expenditure and personal well-being, we control for various other factors in our model, that could potentially influence well-being, such as employment status, sex, age, relationship status, etc. [5] Results are presented in Section 3.3.

[5] For a full list of control variables see Annex E

In this analysis, using the survey design controlled for the potential dependence of the individual observations with each other and applying the survey weights provides some protection against model misspecification. Huber-White standard errors, which are robust to heteroskedasticity, were calculated when estimating the regressions.

3. Results

3.1 Income and expenditure across the income distribution

We obtain an income and expenditure distribution by ranking all households in terms of their equivalised disposable income after housing costs. Comparing disposable income with expenditure of households in the same income decile group highlights an interesting pattern. Figure 1 shows the results of this comparison. Households in the bottom income decile spent, on average, around £12,700 in 2016/17 while their average income, as measuring with LCFS data, was only about £5,000. This is consistent with the findings from other studies, showing relatively high levels of expenditure at the bottom of the income distribution (e.g. Brewer & O'Dea, 2017; Carrera, 2010). Nevertheless, part of this difference reflects likely underreporting of income in the survey, as previously suggested.

Figure 1. Mean household disposable income and expenditure by income decile, 2016/17
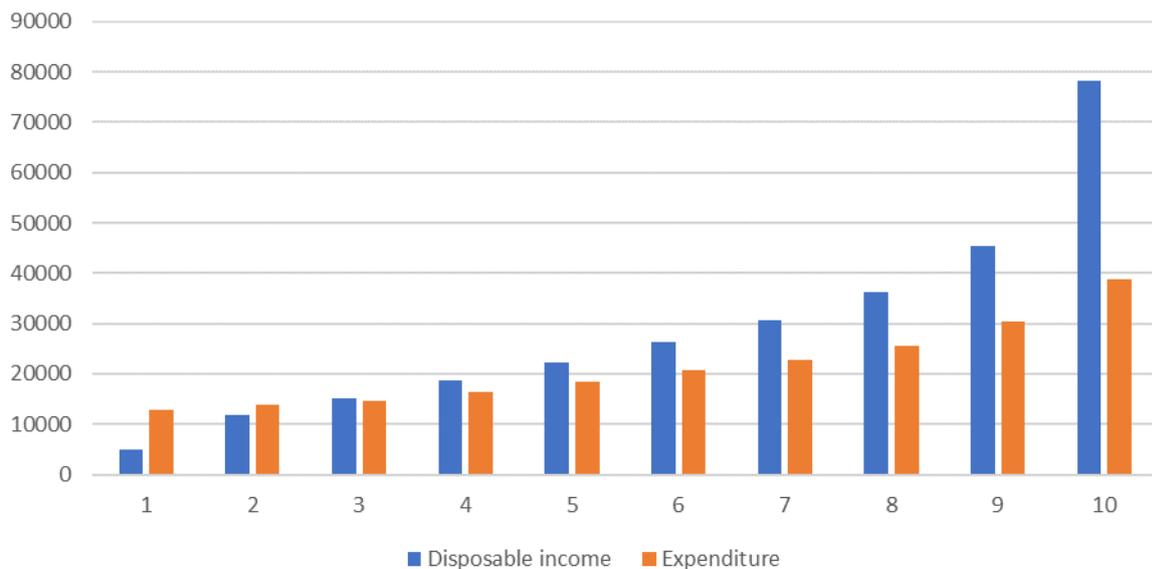
Notes:

1 Both income and expenditure have been equivalised using a 'companion' scale of the modified-OECD scale (see annex)

2 All figures are after housing costs (see annex)

Previous studies have suggested that having higher levels of expenditure relative to income may be explained by a combination of factors. Some of these households may be at the bottom of the income distribution only temporarily, experiencing a short-term period of low (or even negative) earnings. Where households are experiencing temporary low-income spells, some may be able to maintain their consumption level and thereby their living standards fairly constant, through the use of

savings or borrowing. Evidence to support such explanations come from Carrera (2010) who shows that households with high levels of expenditure relative to their income are more likely to contain someone in higher education or have a chief economic supporter who is self-employed.

As previously indicated, researchers such as Brewer & O'Dea (2017), have provided evidence to suggest that surveys are more likely to underestimate income at the lower end of the distribution than expenditure. Further evidence for this explanation comes from DWP (2018), which shows that certain types of benefits tend to be under-reported in survey data. These include working and child tax credits, pension credit and other non contributory benefits related to disability or care necessity.

3.2 Characteristics of individuals in income and expenditure poverty

Figure 2 presents poverty rates for children, working-age adults and pensioners in 2016/17, along with overall poverty rates, based on the two poverty measures used in this analysis.

Figure 2. Breakdown of income and expenditure poverty in 2016/17
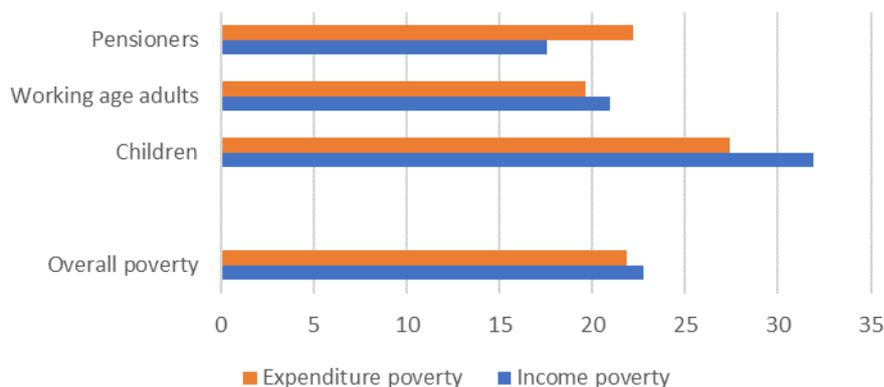

Pensioners appear to be the only population group who had a higher expenditure poverty rate (22.2%) compared to their income poverty rate (17.5%). This finding has been confirmed in other studies, among which Brewer and O'Dea. (2017), who argue that pensioners are an interesting group to look at because those on low incomes tend to be even lower spenders. Banks et al (1998) show that the discrepancy may be partly explained by the lack of labour market participation among retired households, since the spending needs of households out of the labour market appear to be less than those of workers. Other explanations offered in literature include heightened fears among retired households of unexpected injury or illness, or a desire to maintain wealth levels to provide an improved inheritance to relatives. The tendency for retired households not to run down their wealth significantly is referred to as the "retirement-savings puzzle" (see Andreu et al.,2015). The distinction between consumption and expenditure is particularly important when considering retired individuals since they are likely to own a lot of durable goods which they get a large consumption flow from, without any spending.

The poverty rate for working-age adults in terms of income, is about 1 % higher than the expenditure based poverty rate for the same population group. The difference between the two measures is quite significant for children, with income poverty rate of 31.9% and expenditure poverty rate of 27.4%

To better understand these differences, we look at a more detailed demographic breakdown of income and expenditure poverty rates. Figure 3 further breaks down poverty rates by employment status, number of children in a family, and household composition.

Figure 3. Poverty breakdown by household composition, 2016/17
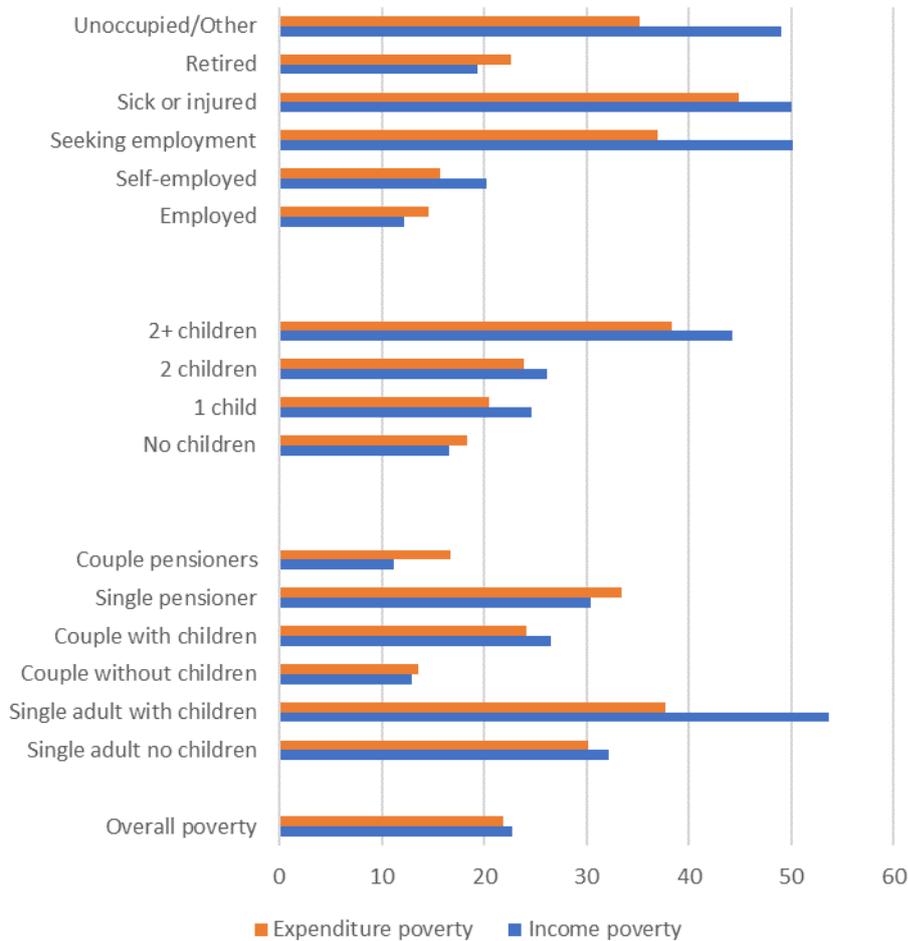

When labour market status is considered, the largest discrepancy between income and expenditure poverty rates in 2016/17 was observed for the Unoccupied/Other group. These are most likely stay-at-home parents, students, etc, who may have volatile income flows but are able to smooth out consumption. Those seeking employment also had significantly higher income poverty rate (50.1%) compared to their expenditure poverty rate (36.9%). As mentioned earlier, it is reasonable to assume that this discrepancy arises because these people are relatively likely to be experiencing short episodes of low income, but are able to smooth consumption by drawing on savings or borrowing additional resources.

In terms of household composition, lone parents had the highest income poverty rate among all groups, 53.7%. The corresponding expenditure poverty figure was 37.7%. Couples without children and pensioner couples had a relatively lower income poverty rates of 13% and 11.2%, respectively.

Apart from looking at the composition of income and expenditure poverty, it is interesting to see how expenditure habits of these two groups differs, and how that compares to households who are not in poverty. Figure 4 presents the proportion of total AHC expenditure that each of these three population groups spent on different categories. Those who were deemed to be in income poverty had

a relatively similar expenditure composition compared to those not in poverty, with largest proportion of spending on recreating, transport and other goods and services. For the people in income poverty, spending on food and drink represented a higher proportion of total expenditure (20%)% than the corresponding figure for those not in poverty (14.6%). Individuals deemed to be in expenditure poverty, spent an even higher proportion of their expenditure on food (28.8%). This population group also spent a higher proportion on electricity, gas and other fuels, than individuals in expenditure poverty and those who were not in any kind of poverty.

Figure 4. Share of total expenditure by category, 2016/17 [6]

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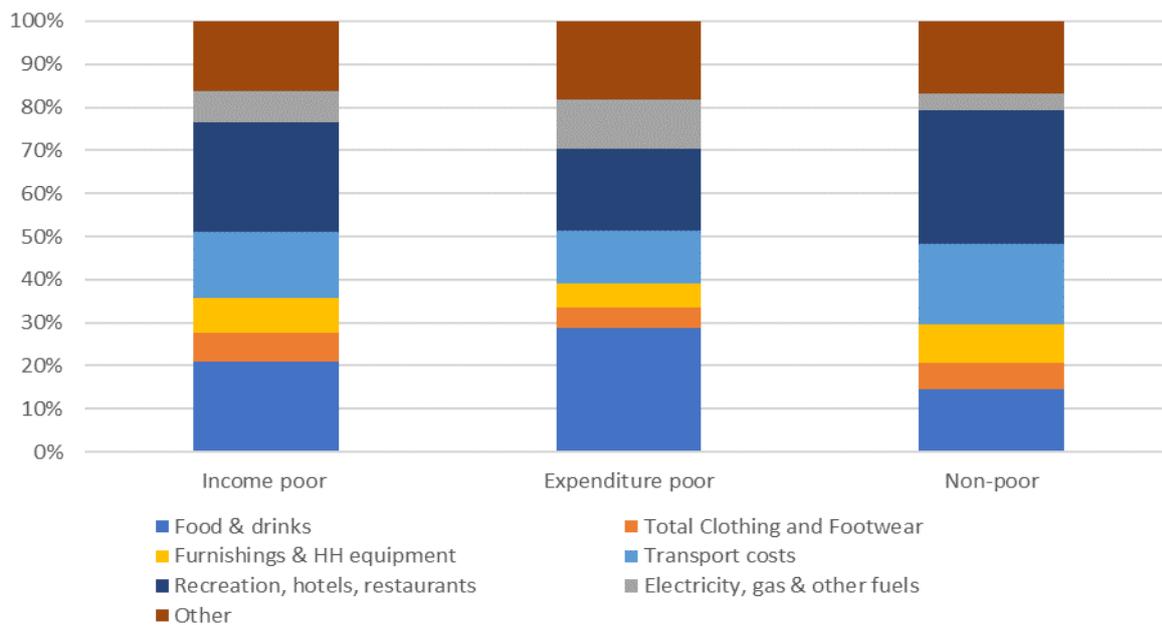
1. Total expenditure value is based on our AHC measure defined earlier
2. The "Other" category includes expenditure on health, education, communication miscellaneous goods and services

3.3 The relationship between income and expenditure poverty

In this section, we look in more detail at the relationship between income and expenditure poverty. Table 1 splits the population into four groups – those in income poverty only, expenditure poverty only, both income and expenditure poverty, and not in poverty. People who are deemed to be both in income and expenditure poverty have a lower median income (£9,800) than those who are in income poverty only (£11,200). Those who are both in income and expenditure poverty also have lower median expenditure (£7,377) than those who are expenditure poor only (£8,590). This suggests that those who are in poverty on both measures are worse off than those experiencing poverty on a single dimension.

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[6] COICOP is a UN classification of individual consumption according to purpose.

Table 1. Median income and expenditure for different population groups, 2016/17

£ per year	Income poor	Expenditure poor	Income & Expenditure poor	Not poor
Median income	11,257	20,593	9,820	30,289
Median expenditure	15,829	8,590	7,377	21,508

Figure 5 below shows the income and expenditure poverty rate for 2016/17 Figure 5 shows they are not necessarily the same individuals. In 2016/17, 11.5 % of the UK population were identified as both income and expenditure poor. In other words, of the approximately 14.9 million people who were in income poverty, 50% or around 7.6 million were also deemed to be in poverty based on their spending. Similarly, of the approximately 14.3 million people in expenditure poverty in 2016/17, 47% were also considered to be in income poverty.

Figure 5. Overlap between the income and expenditure poor
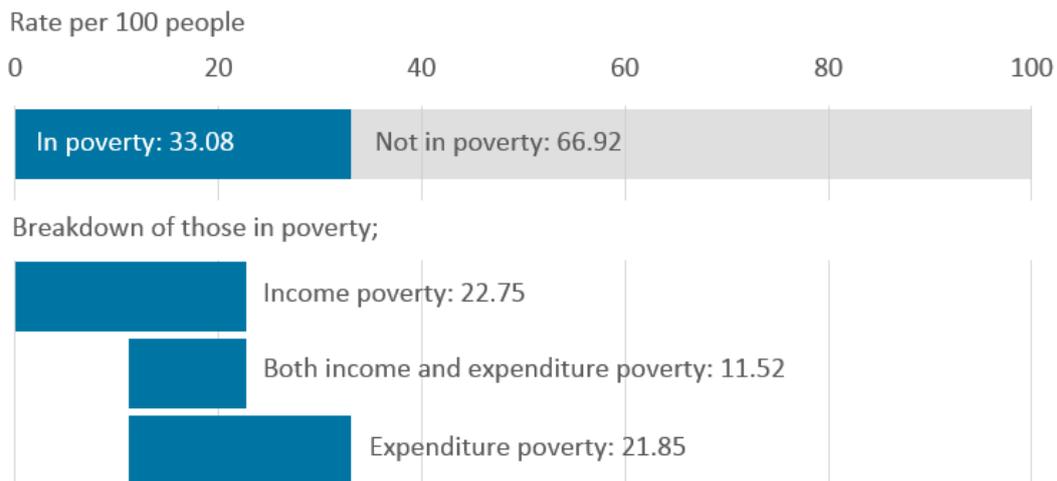
Source: Office for National Statistics

To explore this further, Figure 6 shows household composition for those in income poverty only, expenditure poverty only, both income and expenditure poverty, and those not in poverty. Lone parents had the lowest level of expenditure poverty (6%), but the highest income and expenditure poverty rate (31.7%) compared to other groups. People with low level of poverty on all poverty measures were couples without children as well as pensioner couples.
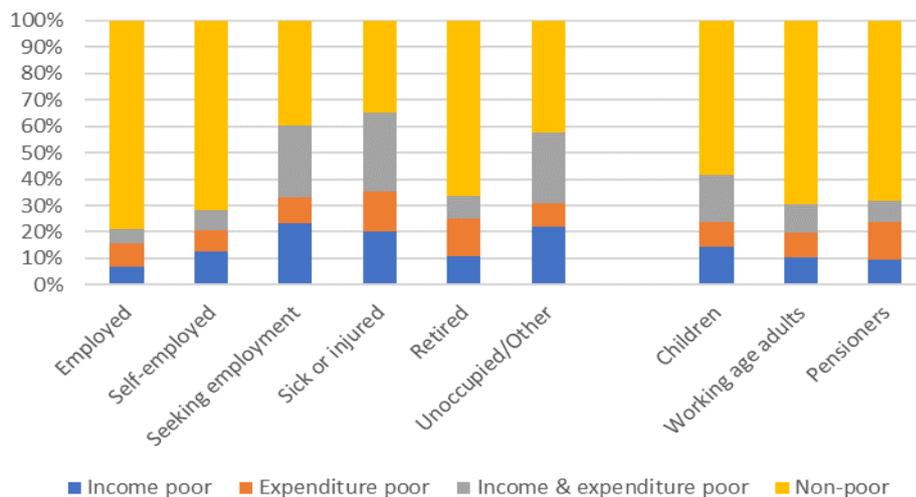
Figure 6. Income and expenditure poverty breakdown by household composition, 2016/17
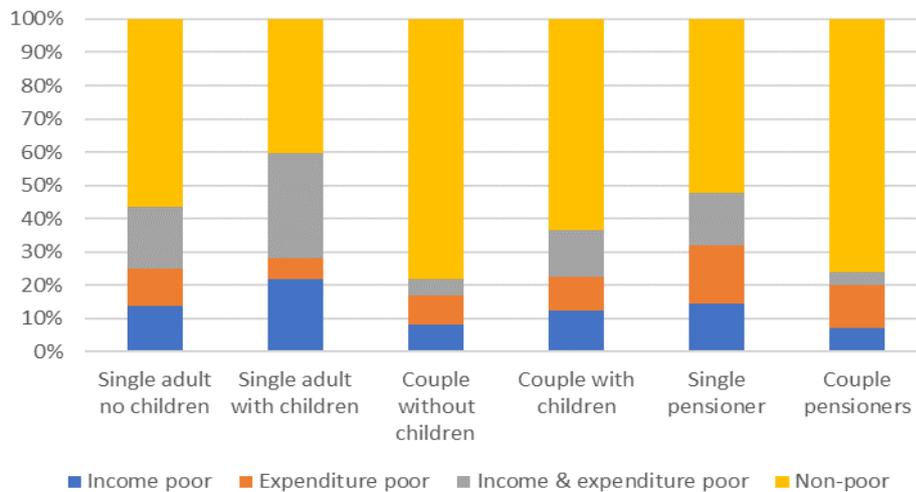
When employment status is considered (Figure 7), people deemed to be both income and expenditure poor are more likely to be sick or injured (29.7%), unoccupied (26.9%) or seeking employment (26.8%).

In terms of the demographic composition of poverty, poverty rates are most prevalent among children, with 17.7% of the total child population deemed to be in both income and expenditure poverty. Overall, 35.9% of the total UK population are in some form of poverty.

Figure 7. Income and expenditure poverty breakdown employment and demographic groups, 2016/17

3.4 Trends in income and expenditure poverty

Before exploring how income and expenditure poverty rates have changed over time, we look at trends in median household income and expenditure - Figure 8. While disposable income has grown by about 17% since 2001/02, household expenditure has been rather stagnant. We see a decline, in real terms, in median household expenditure from 2007/08 onwards, not really starting to recover until about 2012/13. In addition, expenditure dropped in 2008/09, while income was still rising. This may indicate households were saving more in response to the economic downturn of 2007/08, before

incomes start to fall. These two observations are broadly consistent with what national accounts data on household final consumption expenditure per head suggest happened over the same period. [7]

Figure 8. Median household disposable income and expenditure, 2001/02 - 2016/17
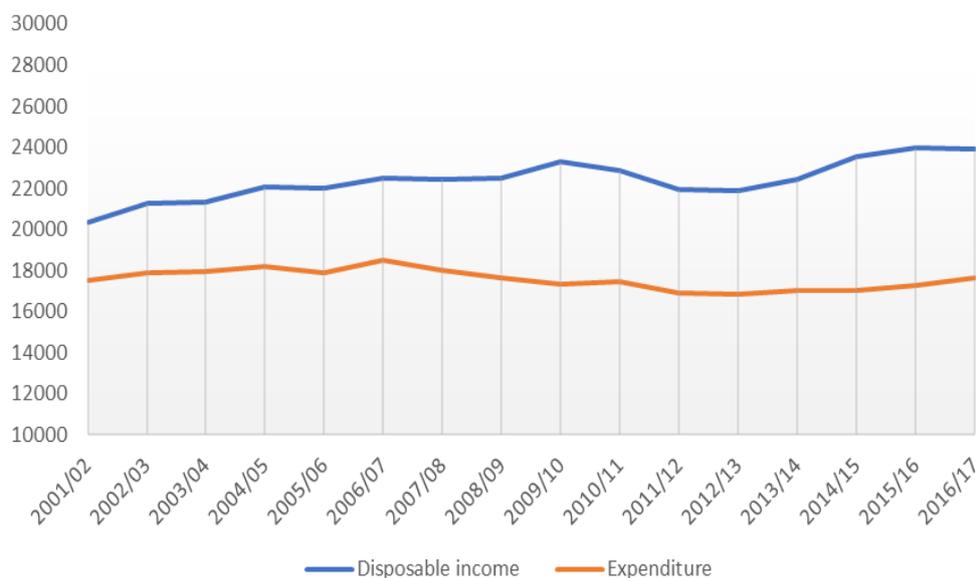
Notes:

1 All figures have been deflated to 2016/17 prices using a CPIX deflator which excludes rents, maintenance repairs and water charges for the period January 1996 to June 2016

2 Both income and expenditure have been equivalised using a 'companion' scale of modified-OECD scale (see annex B)

3 All figures are AHC (see annex A)

Figure 9 below presents the trend for both income and expenditure poverty rates. Overall, the two series are quite similar, though income based poverty rates seem to slightly exceed expenditure based poverty rates, in most years over the period considered. However, for both measures the levels of year-on-year change have been very modest over this period, with levels of both AHC income and expenditure poverty broadly unchanged over the last 15 years.

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[7] See Annex D for national accounts data.

Figure 9. Poverty rates for income and expenditure, 2001/02 - 2016/17
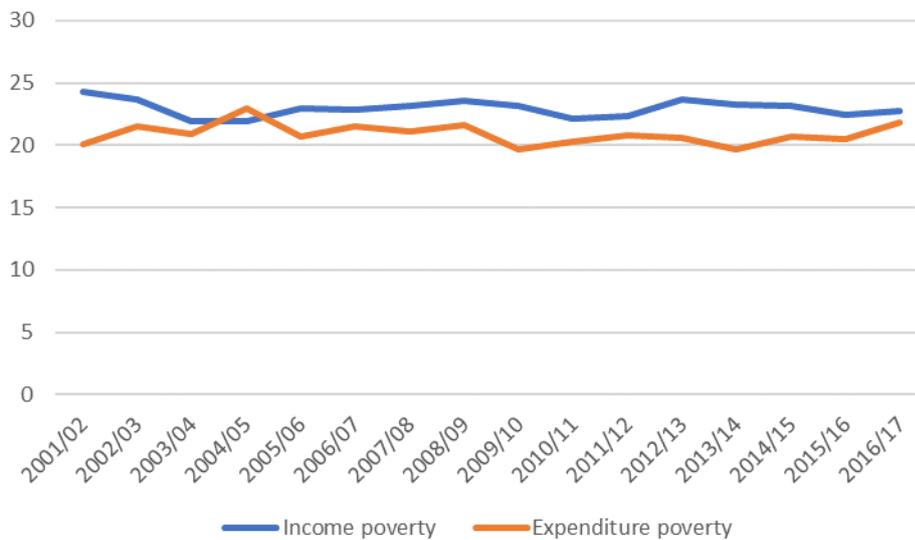
3.5 Well-being results

Results from our regression model are presented in Table 2. Models were estimated with both OLS and ordered probit techniques. With the two showing very similar results, we only present the OLS figures here for sake of simplicity and easy of interpretation. In all four regressions shown in Table 2, the dependant variable is overall life satisfaction score. Regressions (1) and (2) present the relationship between expenditure and life satisfaction and income and life satisfaction, respectively. We apply a logarithmic transformation to both income and expenditure, as it helps the model better fit the relationship between personal wellbeing and income and expenditure. In addition, using logs reduces the skewness of the income and expenditure distributions, thereby decreasing the influence of outliers and helping to 'normalise' the two distributions.

Table 2. Relationship between personal well-being and income and expenditure

Dependent variable: 'How satisfied you are with your life nowadays?' rating on a scale from 0 to 10

Great Britain

OLS regression results	Expenditure (1)	Income (2)	Expenditure poverty (3)	Income poverty (4)
Income OR Expenditure				
Log(equivalised income OR expenditure)	0.266***	0.0712*		
Income OR Expenditure poverty				
Income OR expenditure poor			-0.315***	-0.237**
Reference group: Not poor				
Economic Activity Status				

Employed	0.558**	0.587**	0.586**	0.569**
Self-employed	0.62**	0.651**	0.646**	0.646**
Economically inactive (including retired)	0.397	0.424*	0.411	0.417
Full-time education or work-related government training programme	0.284	0.400	0.316	0.310
Reference group: Unemployed				
Sex				
Female	0.101**	0.105*	0.103*	0.107*
Reference group: Male				
Age				
Age	-0.201***	-0.155***	-0.144***	-0.153***
Age squared	0.002***	0.003***	0.002***	0.002***
Age cubed	0.000**	0.000***	0.000***	0.000***
Dependent Children in Household				
Dependent Children in Household	0.170*	0.132*	0.145*	0.145*
Reference group: No Dependent Children in Household				
Relationship Status				
Cohabiting	0.556***	0.567***	0.566***	0.556***
Single, never married	0.086	0.085	0.084	0.076
Married or with civil partner	0.728***	0.751***	0.741***	0.746***
Divorced/separated, former civil partner (living alone, not cohabiting)	-0.042	-0.036	-0.047	-0.040
Reference group: Widowed				
Housing Tenure				
Being bought with mortgage or loan or through rental purchase	0.259**	0.3486***	0.290**	0.303**
Owned outright	0.44***	0.5266***	0.487***	0.482***
Private rented	0.102	0.200	0.096	0.1270
Rent free	0.942***	0.9568***	0.957***	0.922***
Reference group: Social (Local Authority or Housing Association) rented				
Regions				
East Midlands	-0.093	-0.083	-0.108	-0.086
Eastern	0.015	0.015	0.020	0.019
London	-0.199	-0.192	-0.198	-0.186
North East	0.063	0.048	0.064	0.059
North West (including Merseyside)	0.075	0.067	0.066	0.064
Northern Ireland	0.305**	0.320**	0.284**	0.316**
Scotland	0.022	0.034	0.016	0.027
South East	-0.138	-0.118	-0.131	-0.118
South West	-0.002	0.007	-0.005	0.012

Wales	-0.030	-0.117	-0.124	-0.119
West Midlands	-0.063	-0.102	-0.088	-0.102
Reference group: Yorkshire and the Humber				
Disability				
Individual not in receipt of a disability benefit	0.933***	0.949***	0.948***	0.969***
Reference group: individuals in receipt of a disability benefit				
Highest Qualification				
Degree or equivalent and higher	0.003	0.047	0.036	0.060
GCE A-level or equivalent	-0.103	-0.053	-0.084	-0.060
GCSE grades D-G or equivalent	-0.080	-0.087	-0.082	-0.080
Higher education below degree level	0.009	-0.035	0.027	0.040
No qualification	0.139	0.130	0.142	0.130
Not stated or missing	-0.095	-0.140	-0.110	-0.130
O-Level or GCSE grades A*-C or equivalent	-0.158	-0.157	-0.159	-0.150
ONC National level/BTEC	-0.194	-0.158	-0.187	-0.160
Reference group: Other, including foreign qualification below degree level				
Constant	6.200***	7.416***	7.818***	7.888***
Adjusted R-square	0.1172	0.1109	0.1143	0.1119
Number of observations	7479	7479	7479	7479

Notes: * significant at 5%, ** significant at 1%, *** significant at 0.1%

Results from regressions (1) and (2) provide some evidence that expenditure is a stronger predictor of overall life satisfaction than income. More specifically, Table 3 shows that doubling of income is associated with 0.05 points higher average life satisfaction score on scale of 0 to 10. In contrast, doubling of expenditure is associated with 0.18 points increase in average life satisfaction score, on the same 10-point scale.

Table 3. Relationship between household income and personal well-being, after controlling for individual characteristics

	Overall life satisfaction
Log of equivalised income	0.071*
Difference in life satisfaction associated with a doubling of equivalised disposable household income (points on the 0–10 scale)	0.049*
Log of equivalised expenditure	0.266***
Difference in life satisfaction associated with a doubling of equivalised disposable household income (points on the 0–10 scale)	0.184***

Notes: * significant at 5%, *** significant at 0.1%

We also look at the relationship between personal well-being an income and expenditure poverty. Regressions (3) and (4) show that both relative income and expenditure poverty are associated with

overall life satisfaction, but expenditure poverty is more strongly associated with lower levels of overall life satisfaction than income poverty.

Comparing the overall results, the regression models which included household expenditure rather than household income were able to explain slightly more of the differences in people's life satisfaction. This suggests that household expenditure may be a more accurate predictor of this aspect of personal well-being than household income. Models (1) and (3) using household expenditure were able to explain 11.7% and 11.4% of the variance in life satisfaction, compared with the two income models, (2) and (4), which accounted for 11.1% and 11.2% respectively.

The explanatory power of the regression models used in this analysis is similar to those of other reported regression analyses undertaken on personal well-being (e.g. Kahneman and Deaton, 2010; ONS, 2013). The relatively limited explanatory power of all the models is potentially due to leaving out important factors which contribute to personal well-being. For example, genetic and personality factors are thought to account for about half of the variation in personal well-being. It has not been possible to include variables relating to personality or genes in the models as the LCFS does not include data of this type.

The regression analysis we present cannot establish with certainty whether relationships found between the independent and dependent variables are causal. For example, the usual assumption is that income and expenditure are independent variables which may affect personal well-being However, some of the association between well-being and income and expenditure may be caused by the impact of personal well-being on people's ability to earn income or on their propensity to consume/spend.

In addition, it is important to recognise that the coefficients reported in this article cannot be taken as the difference in well-being experienced immediately before or immediately after a change in income or expenditure. Previous studies (such as Di Tella et al., 2003) have suggested that an increase in economic prosperity can lead to a large increase in well-being immediately after the change occurs. However, over time people can "adapt" to their new level of prosperity, and their reported well-being appears to fall over time back to a level closer to that before the change. Brickman et al. (1978) appear to find this even in the case of extreme changes in prosperity, by observing the well-being of lottery winners.

4. Conclusion

Both income and expenditure measures of poverty have their strengths and limitations, as shown in this analysis. Although in many developed countries, household income tends to be most commonly used as a metric when measuring material living standards, we have shown that looking at expenditure measures is just as important, and that a lot can be learned from considering these measures together.

Our analysis shows that individuals who are considered to be in income poverty are not necessarily in expenditure poverty, and vice versa. Approximately 33% of the UK population was in some form of poverty in 2016/17, with 11.5% of individuals being both in income and expenditure poverty, according to our poverty measure. The group among which poverty rates were most prevalent was lone parents – 31.7% of all lone parents were considered to be both income and expenditure poor in 2016/17.

Serafino & Tonkin (2017) suggest that the degree of overlap between these groups may provide valuable information in supporting the effective development and targeting of policies. For example,

where a house- hold is income-poor but is maintaining expenditure levels (i.e. those in income poverty only), this may indicate that the household is able to draw on savings or access loans either informally or formally to maintain living standards. In some cases, such behaviour may be driven by knowledge or expectation that household income will increase in the near future, for example, those starting a new job soon or students. However, many households of this type will remain vulnerable to poverty as the resources they are relying on are finite and the situation cannot continue indefinitely.

Expenditure poverty in the absence of income poverty may, in part, reflect aspects of choice on the part of the individuals. It may also suggest precautionary saving and a lack of accumulated wealth or assets which could be used to maintain living standards if income does drop. This may occur in employment that has no guaranteed future income, for example those in short-term employment and the self-employed.

Our regression analysis results show that relative expenditure poverty is a stronger predictor of overall life satisfaction than income poverty. While further research is needed to develop insights in this area, our analysis provides some additional support for the view that household expenditure may be a better measure proxy of material well-being than income.

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Annex

A. Definitions

The measure of income used in this analysis is household disposable income which we publish in our annual publication of the Effects of Taxes and Benefits on Household Income (link), with a few adjustments that reflect the AHC dimension we are focusing on.

Income AHC

Start from the standard household disposable income measure which we publish in our annual publication of the Effects of Taxes and Benefits on Household Income. This measure of income takes account of benefits and direct taxes. The following housing related costs are excluded:

- gross rent and rent on second dwelling
- maintenance and repair of dwelling
- water rates, community water charges and council water charges & ground rent and service charges
- mortgage interest payments
- structural insurance

Our measure is broadly consistent with the HBAI's definition of AHC disposable income, with the following exceptions:
- rent on second dwellings is not included as a housing cost, but instead the profit on such properties is treated as investment income.

- maintenance and repair of dwelling is not included in housing costs

Expenditure AHC

Start from total consumption expenditure from LCFS, which excludes mortgage interest payments, council tax and Northern Ireland rates. The following adjustments are then made:

- take out gross rent and rent on second dwelling
- take out maintenance and repair of dwelling
- take out water rates, community water charges and council water charges & ground rent and service charges
- take out insurance premiums related to housing
- include expenditure on Licences, fines and transfers
- include holiday spending
- include gambling receipts as negative expenditure

Child:

A dependent child is defined as an individual aged under 16. A person will also be defined as a child if they are 16 to 19 years old and they are:
- Not married nor in a Civil Partnership nor living with a partner; and
- Living with parents/a responsible adult; and
- In full-time non-advanced education or in unwaged government training.

Pensioner:

Anyone who is of the State Pension Age at the time they were interviews is considered to be a pensioner.

B. Equivalisation of household income and expenditure

To reflect household composition, we use an equivalisation scale that accounts for the AHC aspect of the measures we have focused on. It is 'companion' scale that DWP use in their HBAI publication when looking at AHC figures. It takes into account the fact that housing is more shareable then food, for example.

Table 2. Companion equivalisation scale

| Household member	Variant 1 factor	Description
1st adult	0.58	Much 'flatter' scale than modified OECD, to reflect lower economies of scale in non-housing consumption
Other 2nd adult	0.42	
3rd adult	0.42	Equal to 2nd adult, as in modified OECD
Subsequent adults	0.42	Equal to 2nd adult, as in modified OECD
Child under 14	0.20	Preserves the BHC (modified OECD) ratio of child to couple
Child 14+	0.42	Equal to 2nd adult, as in modified OECD

Figure below shows the impact of using the 'companion' scale.

Figure 10. Median household disposable income - modified OECD vs DWP 'companion' scale
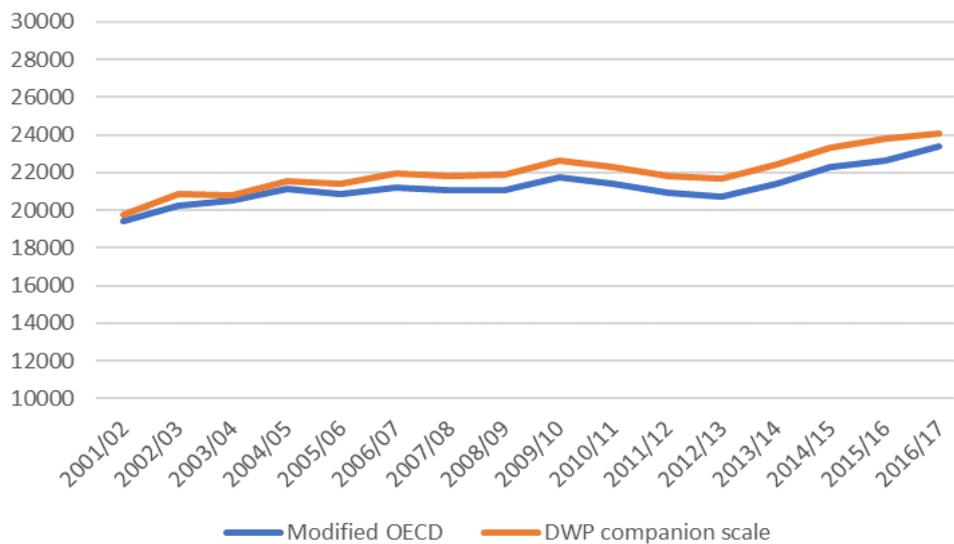
C. Comparison with DWP figures

Figure 11. Median equivalised household disposable income in LCFS and HBAI
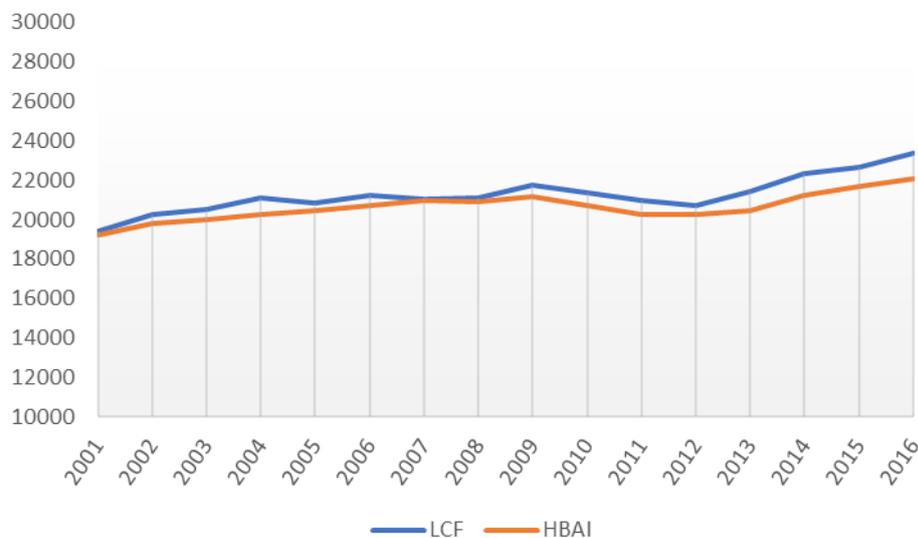
1 All figures have been deflated to 2016/17 prices using a CPIX deflator which excludes rents, maintenance repairs and water charges for the period January 1996 to June 2016

2 Both income and expenditure have been equivalised using a 'companion' scale of modified-OECD scale (see annex)

3 All figures are AHC

Median household incomes in LCFS and HBAI have moved relatively closely together, with LCFS estimates slightly higher than HBAI, up until 2012/13. Growth in LCFS figures has been somewhat stronger since 2012/13, however, the estimated are broadly comparable.

Figure 2 shows relative income poverty measures from LCFS and HBAI since 2001-02. The two series follow a similar pattern over time and although income poverty based on LCFS data is higher than HBAI estimates, overall, the difference seems reasonably consistent over time. The two sources appear to move quite close together in 2015/16 and 2016/17.

Figure 12. Income poverty in LCFS and HBAI, 2001/01-2016/17
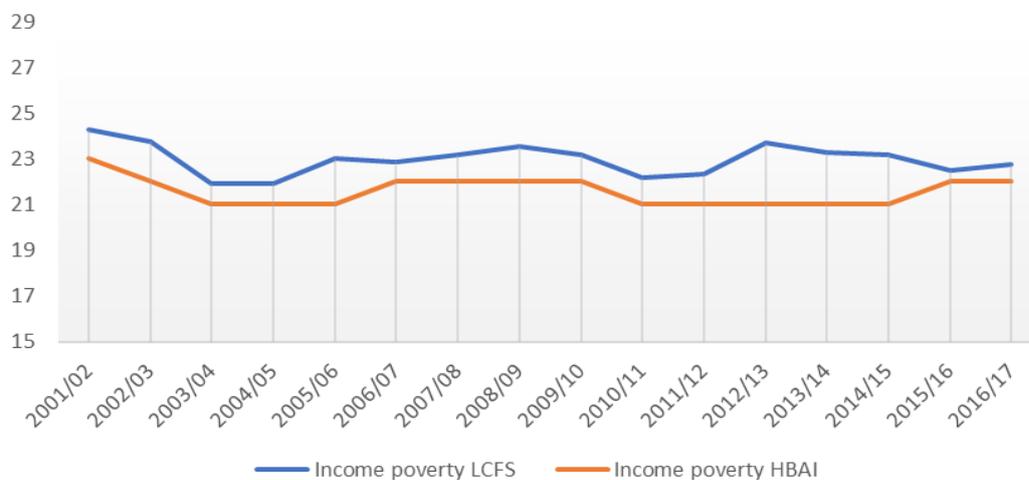
The two series follow a similar pattern over time and although income poverty based on LCFS data is higher than HBAI estimates, overall, the difference seems reasonably consistent over time. The two sources appear to move quite close together in 2015/16 and 2016/17.

D. National accounts data on consumption expenditure

Figure 13 shows the growth in real household final consumption expenditure per head. This shows a long-term time series from 1977 Quarter 1 to 2017 Quarter 4. The economic downturn of 2008-09 is clearly shown in these data with a slow-down in growth in real household final consumption expenditure per head, and a recovery to around 2% from 2012 onwards. The information provided in this chart is broadly consistent with survey trends in household income and expenditure we have observed in the past 15 years.

Figure 13. Growth in real household final consumption expenditure per head
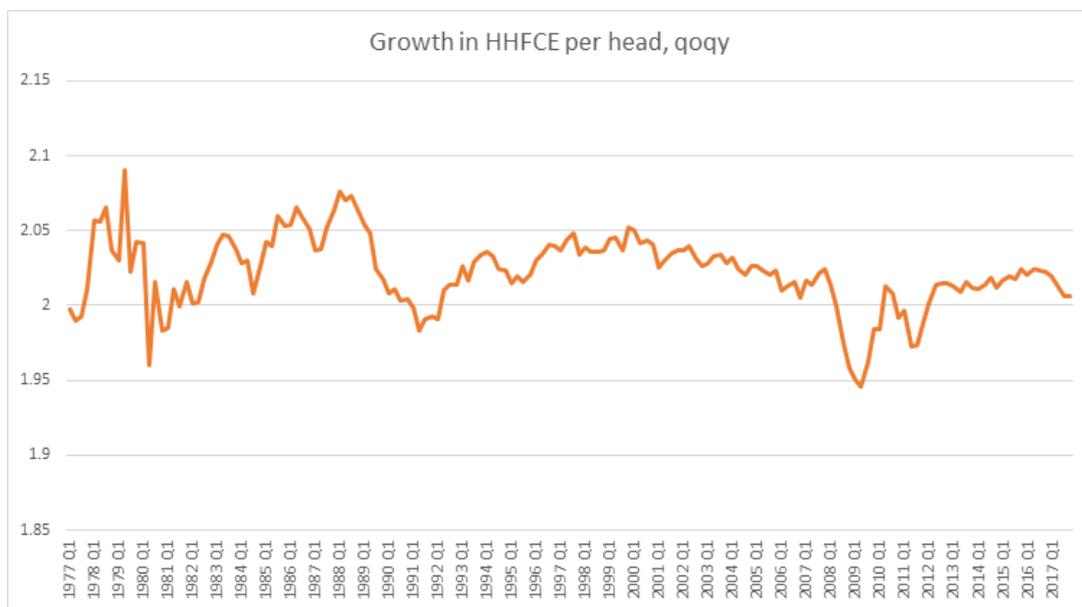
E. Well-being analysis

The following control variables were used in the regression analysis

- employment status,

- sex,

- age,

- whether there are dependent children in the household,

- relationship status,

- housing tenure,

- region of Great Britain

- personal receipt of a disability benefit (this is included as a substitute for self-reported health or disability, which are not available from the LCF. Further information on what is contained in this variable can be found in the section Supporting Information),

- highest qualification obtained,

The relationships between many of these variables and personal well-being are explored in detail in ONS (2013) using data from the APS.